

many appearances observed by the author in connexion with the peripheral distribution of the nerves, not only in certain tissues of man and the higher mammalia, but also in invertebrate animals.

11. The distribution of the finest branches of the nerve-fibres can only be demonstrated in tissues which have been immersed in fluids which refract highly, as syrup or glycerine.

III. "Researches on the Development of the Spinal Cord in Man, Mammalia, and Birds." By JACOB LOCKHART CLARKE, Esq., F.R.S. Received May 20, 1862.

(Abstract.)

In the first stage of development the spinal cord consists simply of a canal surrounded by a single layer of small cells or nuclei, which are not distinguishable from each other in regard to size or structure, and are so closely aggregated as to appear in actual contact. After a time this homogeneous layer, while it increases in depth, separates irregularly into two strata, the inner stratum forming the epithelium, and the outer the grey substance. This differentiation of structure proceeds gradually, and is not at first marked by any definite line of separation, nor by any apparent difference in the structure of the component cells. At the same time there is gradually formed around the walls of the nuclei a granular substance, which unites into processes or fibres, and constitutes a continuous network, by which all the nuclei or cells of both layers are uninterruptedly connected. In the grey layer there is at first no apparent difference between the nuclei or cells of the anterior and posterior portion, although in each portion dark or more closely aggregated groups may be observed in connexion with roots of the nerves. As development advances, however, while the nuclei of the posterior grey substance remain for a long time but little altered, those of the anterior substance increase in size, become more granular, and are connected by thicker fibres united in a coarser network. At the same time, in the separate groups of the anterior grey substance, the granular network around the nuclei assumes a coarser and sponge-like structure, until it constitutes a number of large roundish or irregular and adjacent cells with thickening and nucleated walls. While these are in course of development, the contained nuclei are forming

within them and around themselves a gradually increasing layer of finely-granular substance. The thick cell-walls have all the appearance commonly assumed by connective tissue, and are continuous with that tissue in the grey substance of the cord.

In the intervertebral ganglia there is some difference in the manner in which the nerve-cells make their appearance. The small cells or nuclei gradually enlarge, assuming a variety of shapes; and it is not till they have increased to a considerable size that nuclei and granular contents are observable within them. These cells, like those of the cord, are connected, not only with each other, but with fibrous prolongations from the sheath of the ganglion, with the intervening connective tissue, and with the sheaths of blood-vessels, in one uninterrupted network. The fibres of the posterior roots of the nerves, as they pass through the ganglion, split up and subdivide into fibrillæ, which become successively continuous with processes of series of the nerve-cells, which for the most part are cup-shaped or pyriform.

The processes of the epithelium around the canal of the cord are directly continuous with the connective tissue and with the sheaths of blood-vessels and pia mater at the surface.

In the early stages of development, then, it appears that there are two kinds of nuclei in the grey substance of the cord: that one kind develops the general network of tissue which pervades the entire substance, but proceeds no further; that each of the other kind, while it is connected with this network, as well as with the true nerve-fibres, develops around itself a nucleated wall, which is still connected, and ultimately blended with the surrounding reticular structure, but, proceeding further, it again forms around itself and within the cell-wall an increasing layer of granules. The granular contents of the cells are connected with their walls, which they form around themselves; the walls of the cells are continuous with the connective tissue, and this again is continuous with the sheaths of the blood-vessels and pia mater of the surface, as well as with the processes of the epithelium: so that the connective tissue of the cord would appear to be intermediate in its nature between the nerve-tissue and the pia mater on the surface; but there is no reason to believe that the connective tissue could ever be developed into nerve-tissue.